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the synonymy carefully worked out. There is as yet no complete work of the kind for any part of the United States which surpasses it, and it will ever remain a land-mark in the ichthyological literature of the country ; for it is a storehouse of facts, and it was the successful collecting and simple presentation of facts which made the volumes of several of the earlier commissioners — Harris, Gould, Storer, and Emerson — models of what natural history work of permanent value should be.

Dr. Storer's other considerable publication, the " Synopsis of the Fishes of North America," a quarto volume of nearly three hundred pages, published in 1846, is of less value, because distinctly a work of compilation, and he was not so skilled in the niceties of classification as in the descriptions of the different specific forms and the study of their histories; but it was the first considerable attempt to collate existing material, and as such it had its importance and convenience.

A man full of enthusiasm and sympathy, fearless, impulsive and generous, high-minded, high-spirited, and with a noble scorn of anything mean, deceitful, or unjust, Dr. Storer endeared himself alike to pupils and associates. No one who has known him will forget the open, brilliant expression of his mobile countenance, his piercing, friendly eye, the quick, impulsive speech, full of force and geniality ; he was a friend worth making a sacrifice for, and not to be forgotten. In 1829, he married Abigail Jane Brewer, sister of the ornithologist, the late Dr. T. M. Brewer, by whom he had three sons and two daughters. His wife died in 1885. His children survive him; two of his sons have distinguished themselves in science, and have been elected to membership in this Academy. Dr. Storer was the recipient of many honors in his medical profession, a member of many learned societies, and received from his Alma Mater the degree of Doctor of Laws in 1876. At the time of his death he was the oldest physician in Boston.

## CYRUS MOORS WARREN.

Cyrus Moors Warren was born at Fox Hill, West Dedham, Massachusetts, January 15, 1824. He died at Manchester, Vermont, August, 13, 1891. He was a remarkably well defined example of that particular type of the American character which has been admirably depicted by Mr. Henry James in one of his best known novels. Bold, ready, persistent, intelligent, with unusual aptitude for business and for the affairs of ordinary life, and possessing decided administrative ability, he was none the less attracted instinctively by things high and excellent, and he sought faithfully, according to his lights, for the best which the world has to give. In his early years he devoted himself with untiring energy to the accumulation of property; but in middle life he gave himself up to the service of science with the same zealous ardor and with distinguished success. It then appeared that he cared for money only as a means to worthy ends, for he was liberal almost to a fault, and it was especially noticeable that he never shrank from expense when it appeared that by freely employing money some obscure point in science might be made clear. To his friends he was a constant reminder of the truth of the Old World dictum, "L'Américain ne se redoute à rien," and his work may well be regarded as a symbol of great things which will come to be when Americans such as he was shall more commonly than now happens give themselves up as he did to scientific pursuits.

This type is distinctively a product of our Western States. Many people at the East have no just conception of it. It was said indeed by a Boston lady who had been accustomed all her life to the society and the admiration of men wealthy, artistic, literary, and scientific, that she had never met or seen in her experience any such person as Mr. James's hero. But it was an easy matter to prove that she had not looked in the right place, even as Thoreau made answer to the seeker of arrow-heads by stooping to pick one up from the road on which they were walking.

Cyrus was the fifth son and the eighth child in the family of eleven children of Jesse and Betsey (Jackson) Warren, who came of old Massachusetts stock, of English origin, related in fact to the Warrens and Jacksons whose names have so constantly been conspicuous in the history of this State. Both of them belonged to well defined branches of the original stocks. Jesse Warren, the father, a man of decided ingenuity, was a blacksmith, who employed many men and carried on establishments which must have been large for those days. He became at length a manufacturer of ploughs also, which were esteemed in their time. He invented the so called swivel, or side-hill plough, and was, if not the first, among the first of New Englanders to make the working parts of ploughs of cast iron. Not having been pecuniarily very successful at Dedham, the elder Warren bought a farm at Peru, Bennington County, Vermont, in the very heart of the forests of the Green Mountains, and established also a foundry, plough-shop, and smithy there, in 1829, when the boy Cyrus was five years old. The wildness of the place may be conceived of from the facts that one night wolves killed a number of sheep in a field close to the house, and that the trunks of sweet-apple trees in the orchard were scratched by the claws of bears which came to gather the fruit. In doing so they left marks which made an abiding impression on the heart and the mind of the boy. It was in this region that the early childhood of our late associate was passed, and it was in such schools as the locality and the State could offer that his education was gained. When he was thirteen years old his father again moved, to Springfield, Vermont, and carried on an iron foundry there, which was totally destroyed by fire two years later, to the complete impoverishment of the family.

Cyrus, as he grew older, — together with his next elder brother, Samuel M. Warren, — became ambitious of obtaining a more liberal education, and both of them directed their energies earnestly to this purpose. For a number of years they supported themselves as best they could by any work they could find to do. They taught schools in the winters, and worked in hayfields during the summer vacations, pursuing their studies meanwhile at every opportunity, in the early morning and late at night, often under great difficulties, until the elder brother, in the hope of more speedily gaining the desired end, conceived an idea of improving the process of covering roofs with tarred sheathing, which was then struggling into existence. Samuel established works to this end at Cincinnati, Ohio, in 1846, and in the course of the next year asked his brother Cyrus to join him. A partnership was soon formed by the two brothers, with the understanding that, the moment the profits of the business should admit of it, the elder brother should be at liberty to study a profession, thus carrying out his fixed purpose from the beginning. The business succeeded so well that Samuel soon entered a lawyer's office at Cincinnati, and afterwards studied for a time at the Dane Law School in Cambridge. He graduated in due course from the Cincinnati Law School, and was admitted to the bar; but afterwards became a minister and preached at Brookline, Massachusetts, and for a number of years in London, England.

Cyrus remained meanwhile in Cincinnati, and he was married there in 1849 to Miss Lydia Ross. Other brothers had been called in to help carry on the roofing business, and in due course Cyrus, in his turn, found the purposed opportunity to devote himself wholly to study. He moved to Cambridge with his family in 1852, and entered the Lawrence Scientific School in the departments of Zoölogy and Chemistry. His first meeting with Agassiz at this time was an important event in his life. He never forgot the cordiality with which he was greeted, and he profited not a little from the advice which was then given him and from the encouragement he received. Agassiz quickly recognized the native force of the man, and sympathized with his thirst for knowledge. He was so well pleased with his efficiency that he urged him to devote his life to the study of natural history, and for a time Warren seriously thought of doing so; but chemistry proved to have a yet stronger claim upon him, and he thenceforth devoted himself to this branch of science. After working two years longer at Cambridge in the Chemical Laboratory, he took the degree of S. B., with high distinction, in 1855, having presented as a thesis the results of a study which he had made of the chemical composition of brain, with estimations of the amounts of sulphur, chlorine, and phosphorus therein contained. He commended himself to his teachers and examiners so heartily that immediately after graduation he was elected an honorary member of the Phi Beta Kappa, on nomination of Benjamin Peirce, seconded by Louis Agassiz, — being the first graduate of the Lawrence Scientific School to whom this honor was accorded.

Soon after graduating from the Scientific School, Warren took his family to Europe, and studied there during several years, first at Paris, then at Heidelberg under Bunsen, at Freiberg in Saxony, at Munich under Liebig, at Berlin under Heinrich Rose, and subsequently in London, — all this in a purely scientific spirit, and with thorough enjoyment of scientific research. It is noticeable that his work in Rose's laboratory on compounds of Zirconium and Titanium is far enough removed from any suggestion of utilitarianism. But though living in an atmosphere of pure science, and devoting himself earnestly to scientific study, he could not help noticing matters which might be of advantage to his brothers and himself in their business, and in this way he was led to the most important work of his life, — the separation and the study of volatile hydrocarbons.

The Brothers Warren had used originally for their roofing purposes the pitch of pine-tar; but the great business success of the firm seems to have depended largely upon their having turned their attention to the coal-tar of gas-works at a time when this material was absolutely without commercial value, and the makers of it were glad to give it away to any one who would remove it from their premises. They were the first in this country successfully to utilize on a large scale what had previously been regarded as a waste product. Thus it happened, long before any one had suspected that various substances obtainable from coal-tar would ultimately be put to highly important uses in the arts, that the Warrens got control of all the tar produced in New York City, and in several other of the larger cities of this country, and had made contracts for long terms of years with many of the largest gas-works, which gave them assured control of all the tar which might be produced. Hence, when the anilin dyes came into use, and a great demand arose for those portions of coal-tar naphtha from which these dyes were made, the Warrens were peculiarly favorably situated for producing the naphtha, and gained large profits by selling it.

Nothing could have been more natural than that the scientific member of the firm should turn his attention to the question how best to obtain these volatile products; and nothing marks the great inventive power of the man more clearly than the masterly way in which he solved this highly intricate problem. His process of "fractional condensation," as published in 1864 in the Memoirs of this Academy, is admirable alike as a means of scientific research and as a technological method. This memoir, with its explanatory diagrams, was widely copied in scientific journals, and an expert travelling in Europe in 1870 found the process in common use there in the distilleries of tar. In some instances the managers of these works knew that they were using Warren's invention, while others professed ignorance as to its origin, while freely admitting its excellence.

By means of this apparatus Warren dissected, so to say, in a most thorough and exhaustive manner the more volatile portions of the tars and oils which are obtained by the distillation of coal and of wood, as well as the naphthas of petroleum; and in so doing he solved well-nigh completely a chemical problem which had been regarded as one of the most intricate of the time. He claimed with justice for his apparatus that it enabled the chemist, occupied with the study of mixtures of volatile, non-decomposable liquids, to prove the negative as well as the positive, since by means of it it is easy to separate and obtain in a state of almost absolute purity the several components of the mixtures, and at the same time to prove that the mixtures contained no other substances than those actually isolated.

One important result of these researches was the wholly unlooked for discovery that the more volatile portions of Pennsylvanian petroleum contain two distinct series of homologous hydrocarbons ($C_nH_{2n+2}$), which run parallel one with the other. The boiling-points of the contiguous members of either series differ by 30° C. But while the several members of the first series boil at 0°, 30°, 60°, 90°, etc., the members of the other series boil at 8°, 38°, 68°, 98°, and so on. That is to say, the members of the two series boil at intermediate points, and the complete separation of them had been as good as impossible before the invention of Warren's method of fractioning. In point of fact, the existence of the double series had caused no little annoyance to chemists, in that they had been able to separate at one time some of the members of one series, and at other times members of the other series, with the result that much confusion prevailed. All uncertainty as to this matter was done away with at once by the publication of Warren's memoir. His discovery was seen to be true the moment attention was called to it. The causes of the previous confusion became manifest, and many of the earlier statements which had seemed to be conflicting were found to be fairly harmonious. He found furthermore that the less volatile portion of petroleum, instead of containing, as had been supposed, higher homologues of the bodies just now referred to, is composed of hydrocarbons of another class, $C_nH_{n+2}$; and of these olefines he separated three, boiling respectively at 175°, 196°, and 216° C. The difference between the boiling-points of contiguous members of this third series he found to be about 20°, and not 30°, as in the other series. Fortunately, an elaborate statement of these results will soon appear, for a completed memoir relating to them was found among Warren's papers after his death.

It is interesting to note the fact that the high degree of purity of the products obtained by Warren compelled him to take special pains to analyze them with particular accuracy. The ordinary methods of ultimate organic analysis had seemed sufficient for the comparatively impure substances studied by his predecessors, — perhaps because the errors due to the impurities known to be present were supposed to be larger than those inherent to the processes of analysis. But the inadequacy of the old methods was shown at once on attempting to study pure hydrocarbons by means of them, and Warren was forced to turn aside for a moment from his legitimate work in order to invent new methods of combustion in oxygen gas, and subsequently to devise a new method of determining the density of vapors.

The years devoted by Warren to the study of the hydrocarbons were the most fruitful of his scientific life. From 1863 to 1866, he had in Boston a thoroughly well equipped private laboratory, in which he gave himself up wholly to research. Eight papers were communicated by him to the Academy at that time, and were published in its Memoirs and Proceedings. Besides the discovery of new substances and the better definition of others which were already known, these papers describe novel and ingenious methods of his invention for the analysis of organic compounds, for the estimation of sulphur and of chlorine, and the determination of vapor densities. They contain among other things a critical discussion of the methods of determining boiling-points, and an exposition of the inaccurate methods and conclusions of some of his predecessors. One of his conclusions was, "that the boiling-point difference for the addition of $C H_2$ in homologous hydrocarbons is generally 30° C., — which is a much larger difference than had been commonly supposed."

Among the details of these researches will be found a statement relating to the separation of hydrocarbons from oil of cumin, which, though nothing more than an incident touched upon solely for the sake of elucidating the main line of the research, may well be cited as an example of neatness, completeness, and elegance in chemical work. Due account being taken of the very small amount of material at his disposition, this particular analysis well illustrates Warren's accuracy and his skill as a manipulator.

It is a matter for lasting regret that Warren was unable to carry out his plans for studying the large collection of pure volatile hydrocarbons which he accumulated during this period, and which for many years subsequently he kept in store. As an example of these things may be mentioned an extremely volatile, elusive, liquid sulphur compound from coal-tar, which he separated in a state of purity and had partially studied. Indeed, his process for determining sulphur in organic compounds was devised for the purpose of analyzing this substance. As it boiled freely at the temperature of melting ice, it had to be condensed by means of freezing mixtures. It was evidently a compound of considerable scientific interest. He called it provisionally "alliole." It is said that by taking pains to free benzol completely from this contamination, the commercial value of the benzol was increased. The purified benzol suited the anilin-makers better than the ordinary article.

From Boston, Warren moved to Brookline, and established another private laboratory there, which was for the time and for his purposes remarkably complete in its equipment. He fully intended to continue his scientific investigations, but so many adverse influences accumulated that he was unable to carry out his plan. For one thing, he was appointed to the Professorship of Organic Chemistry at the Massachusetts Institute of Technology, though he resigned the position after a year or two because it consumed too much of his time. He was continually appealed to also by his business associates, who besought him to help them in new enterprises, and to deliver them from difficulties, which he did frequently with signal success. His partners had missed him not a little during the term of his highest scientific activity; and afterwards, in a period of great commercial depression, they were only too anxious to be helped by "so good a man of business." It must be admitted that his associates had good cause to wish to have him always with them, for he was a conspicuously able and indomitable man, born to command success. To him the failure of an undertaking or loss of fortune meant little more than a new incentive to energy and to labor; and the customary and to-be-expected result of his activity was the recovery of all that had been lost, and more. Though ordinarily mild of manner and extremely good-natured, this determination of character was plainly written on his face; and it was remarked by an assistant in his Boston laboratory, in the winter of 1863, that Warren's mouth must have been copied for making up the photographs of General Grant, which were in that year beginning to be freely displayed.

As a matter of course, no man could long lead a life of such untiring activity. There was no apparent slackening of his mental powers even to the end, but his physical ability to labor sensibly diminished after the very severe strain and long-continued anxiety to which he was subjected during the period of commercial depression which succeeded the panic of 1873. As his physical powers diminished, he suffered frequently from severe nervous headaches, which were manifestly symptomatic of fatigue. But "it took much to discourage him," and to the last he kept himself accurately informed upon all matters of importance relating to a very large business, and did much of the thinking of the firm, and all of its most important correspondence. His partners and he himself knew well that he understood their affairs better than any one else, and could better than either of them attend to the business. The burden upon him was much increased in 1880 by the death of his brother, Herbert M. Warren, who was lost on the "Narragansett," in Long Island Sound. In 1888, when much enfeebled physically by overwork, he had a paralytic stroke, from which he never recovered. Two winters passed at Nassau, and a couple of summers spent in absolute rest in the Adirondacks and in Vermont, failed to restore him, and he died quietly in the summer of 1891.

It would be difficult to write in any way of Warren's scientific career, without making some mention of his business interests. For that matter, many of the results of his scientific labors are upon record, to be seen by every one, and it is instructive to consider in what respect this work was helped or hindered by the business relations. The fact that his firm so extensively controlled the coal-tar of the country forced them, as has been said, to prepare the naphthas therefrom when a demand for these substances arose, and afterwards, in like manner, they were called upon to produce large quantities of anthracene when this compound was required for making alizarin. At a much earlier period they had prepared naphthalin in a condition of almost absolute purity, with the ideas that this solid substance might be put to use by glass-blowers as a convenient fuel to throw into their "glory holes," instead of the "dead oil" used for producing a strong reducing flame, and that it could be moulded into candles, which might be burned out of doors in spring-candlesticks, — both of which plans were brought to naught by the speedy introduction of coal-oil and petroleum, and of paraffin obtained from these oils.

Another venture, which ended in failure, deserves mention as a matter of historical interest; namely, that the Warrens undertook to manufacture anilin colors in this country at a very early period (1862), when the price of these compounds was extremely high. To this end they built a factory at South Boston, and equipped it with costly and ingenious apparatus devised by C. M. Warren. This factory had actually been put into operation, and was producing nitrobenzol, when the price of the anilin dyes suddenly fell to a very low figure, from which point they have never risen again to anything like the former standard. The Warrens were thus compelled to relinquish their undertaking. The reduction in price had been brought about by certain English manufacturers who sought to crush a rival in that country.

From being engaged in all these enterprises Warren had constant opportunity to make note of points that specially needed elucidation in the behavior of the chemical substances operated upon, and he was doubtless able to gain time in many cases as regards his scientific investigations by making preliminary rough studies at the manufactory. Moreover, he could have at any time, for the asking, unlimited supplies of any materials he might wish to investigate, either in the crude or in the partially purified condition ; and he could always be sure that his materials were precisely what they purported to be. It should be remembered always, when Warren's work on hydrocarbons is contrasted with that of his predecessors, that he had enormous advantages over most chemists both as to his methods and his materials. For example, it will be seen at a glance that it was easier for him than for most other investigators to make the discovery of his parallel series of hydrocarbons in the more volatile part of Pennsylvanian petroleum, because he had opportunity to operate upon materials which had never been subjected to any treatment with chemicals. His competitors, working upon commercial products which had been "purified" by agitation with oil of vitriol, were at a manifest disadvantage. There are published results of such investigations, which go to show that a large part of the members of one of the series had actually been removed in some way from the petroleum before it was subjected to scientific examination.

In the course of time, when their contracts for coal-tar had lapsed, and competition between the distillers of tar became sharp, the Warrens paid less attention than they had formerly done to this branch of their business, and turned their energies more particularly to the asphaltum of Trinidad, and to the rectification of this substance by a process which consists essentially in driving off some thirty per cent of water, which is entangled in the crude pitch as taken from the lake, and removing some other mechanical impurities by processes of settling or skimming. The product thus obtained, and known as refined asphalt, is used for electrical purposes, as well as for paving and for roofing. For some uses the purified asphalt is mixed with a certain proportion of petroleum residues that are left in the stills when crude petroleum is rectified.

In the carrying out of these changes Cyrus Warren took a lively interest and gave valuable aid. But it was characteristic of the man that during all the long period of business strain his mind was full of scientific interests and ideas. It is greatly to be regretted that the results of these cogitations and of the experiments made from time to time during this period have never been published. Warren himself felt that several of them should be made known to the world, and he fully intended in his last years to present to the Academy one or more papers relating to these matters. He never ceased to lament that the exigencies of business, in which he had become inextricably entangled, kept him from entire devotion to scientific pursuits. But perhaps the keenest of his regrets was felt when, after he was finally disabled, his physician forbade him to enter his laboratory to do a last work for science in gathering from his note-books and connecting the fragments of the more important labors which had been performed during the intervals of his business activity.

One of his ideas was to make a systematic scientific analysis of that portion of the heavier products of coal-tar which is known as anthracene oil. Anthracene itself is obtained from this grease by pressing the mass in a hydraulic press at a tolerably definite and constant temperature maintained by steam heat, by which means various crystalline substances other than anthracene are expelled; and Warren proposed to isolate each of these compounds by a process of fractional liquefaction or of methodized eliquation. He had gone so far as to have had constructed especially for this purpose, and at very considerable expense, a small compact hydraulic press which carried a copper jacket which was to be filled with water that could be kept at any desired temperature by means of gas lamps. The diameter of the jacket was enough larger than that of the plate of the press to admit of lamps being put under it to heat the water. In this way the mixture of crystals could be pressed again and again, at some one definite temperature, until the substance which remains solid at this temperature had become so pure that nothing more could be squeezed out from it; then the matters which had remained liquid at that temperature could be pressed at another temperature until another substance had been isolated, and so on as long as any of the material was left. This process seems to have reached an eminently hopeful stage of development, when work upon it was interrupted by increased business cares which followed the death of his brother, Mr. Herbert M. Warren, in 1880. It is evident that a manageable process of this kind would find ready applications in the study of waxes, fatty bodies, camphors, paraffins, and some resins, as well as in that of the heavy products of tar. Possibly even the very intricate problem as to the composition of the mixture of oxidized fatty acids, which are concerned in the technical process of currying leather, and in the old method of fixing the color known as Turkey-red upon cotton cloth, might be solved in this way.

This Academy was held by Cyrus Warren in profound respect. He was proud to be a member of it, and he appreciated very highly the scientific atmosphere which he found here. This remark is true also of our lamented associate Ferrel, whose early life had been akin to Warren's in many respects. It was a great pleasure to these men — independent and self-sustained though they both were — to be in touch with scientific associates. They knew that here at least their aspirations would be sympathized with and their efforts be justly appreciated; and it will be well for us all to remember how much such men may be encouraged by an organization of high tone and character competent to hold them steadily to their best ideals.

In Warren's last will and testament were found written the following words: —

"I give and bequeath to Harvard University fifty shares of the stock of the Warren-Scharf Asphalt Paving Company [now equal to $5,000 at the least], to be held by the said University, or to be sold and converted into money, and the proceeds thereof to be securely invested, and the income, dividends, interests, or profits of said stock, or of the proceeds of the same, to be devoted by the said University, in its discretion, to the promotion of chemical research, or the advancement of chemical science. . . .

"I give and bequeath to the American Academy of Arts and Sciences of Boston one hundred shares of the capital stock of the Warren-Scharf Asphalt Paving Company [equal to $10,000], the proceeds, dividends, and income thereof to be applied by the said Academy, its trustees or directors, in their discretion, for the encouragement and advancement of research in the science or field of chemistry. . . .

"I give and bequeath to said American Academy of Arts and Sciences fifty shares of the capital stock of the Warren-Scharf Asphalt Paving Company [equal to $5,000], the proceeds thereof to be applied to or towards a building fund for the purpose of erecting a building for the use of the library of said Academy, and for holding the meetings of said Academy; the same to be used in erecting such a structure when, in the opinion of the directors or trustees of said corporation, a sum sufficient shall be realized to justify such erection."

*Papers by Cyrus Moors Warren.*

1. Ueber einige Zirkonerde- und Titan-Säure-Verbindungen: —
    - A. Ein neues Schwefelsaures Zirkonerde-Salz, etwas Kali enthaltend.
    - B. Schwefelsaures Zirkonerde-Kali.
    - C. Schwefelsaures Titan-Säure-Kali. Poggendorff's Annalen, 1857, CII., p. 449.
2. On a Safety-lamp, for Laboratory Use. American Journal of Science, 1862, (2d series,) XXXIII. 275.
3. On a Process of Organic Elementary Analysis, by Combustion in a Stream of Oxygen Gas. Proc. Amer. Acad., VI. 251. (8 March, 1864.)
4. On a Process of Fractional Condensation; applicable to the separation of Bodies having small differences between their Boiling-points. Mem. Amer. Acad., IX. 121. (10 May, 1864.)
5. Researches on the Volatile Hydrocarbons: —
    - A. Hydrocarbons from Coal-tar Naphtha (p. 137).
    - B. Hydrocarbons from Oil of Cumin and Cuminic Acid (p. 149).
    - C. On the Influence of $C_2H_2$ upon the Boiling-points in Homologous Series of Hydrocarbons, and in some Series of their Derivatives; with Critical Observations on Methods of

taking Boiling-points (p. 156). Mem. Amer. Acad., IX. 135. (11 Oct., 1864.)

6. On a New Process for the Determination of Sulphur in Organic Compounds, by Combustion with Oxygen Gas and Peroxide of Lead. Proc. Amer. Acad., VI. 472. (14 March, 1865.)
7. On a New Process of Organic Elementary Analysis for Substances containing Chlorine. Proc. Amer. Acad., VII. 84. (31 Jan., 1866.)
8. Note on an Improved Apparatus for the Determination of Vapor Densities by Gay-Lussac's Method; being a Modification of Bunsen's Apparatus for measuring Aqueous Vapor. Proc. Amer. Acad., VII. 99. (10 April, 1866.)
9. Hydrocarbons of Pennsylvania Petroleum. American Journal of Science, 1868, (2d series,) XLV. 262.
10. (Posthumous.) On the Volatile Hydrocarbons in Pennsylvania Petroleum. Proc. Amer. Acad., XXVII. 56.
11. (Posthumous.) Note on a Criticism of the Author's Apparatus for Fractional Condensation. Proc. Amer. Acad., XXVII. 89.
12. (With F. H. Storer.) Examination of a Hydrocarbon Naphtha, obtained from the Products of the Destructive Distillation of Lime-soap. Mem. Amer. Acad., IX. 177. (9 Aug., 1865.)
13. (With F. H. Storer.) Examination of Naphtha obtained from Rangoon Petroleum. Mem. Amer. Acad., IX. 208. (9 Aug., 1865.)

## SERENO WATSON.

Sereno Watson, a Fellow of this Academy, died at his home in Cambridge on March 9, 1892.

To most of his associates here he was known only as a regular attendant at our meetings, and an occasional contributor to our Proceedings, presenting his communications, which were of a technical character, by title.

His co-laborers in Natural History recognized him as a critical student in the department of Descriptive Phænogamic Botany, who enriched our volumes by the results of work of a high order.

Those who were engaged in neighboring fields of botanical investigation knew him as a faithful friend of few words. He was observed by them to carry on his researches in silence, seldom alluding to any special task in hand until it drew near completion, and even then only briefly. He was always ready to interrupt his studies to assist others in theirs; he would enter with unconcealed pleasure into the plans of others, but without ever speaking of his own.

Hence it happens that his intimate friends, when called upon to